Ionic Pre-concentration XRF Detection and Analysis Device, System and Method

Abstract of Disclosure

A device, system and method for detecting and measuring concentrations of elements in fluids comprises: flowing a fluid through a central flow interelectrode gap of an ionic preconcentration cell separating an upper high specific surface area electrode from a lower high specific surface area electrode of the ionic preconcentration cell by a predetermined interelectrode gap width; and applying a voltage differential between the upper high surface area electrode and the lower high surface area electrode while the fluid is flowing through the central flow interelectrode gap. As such, this cell that utilizes its inherent capacitance for double layer formation to extract ultra-trace levels of ionic contaminants from aqueous solutions in order to enhance detection by x-ray fluorescence analysis. Concentration enhancement is achieved by capturing solute ions from the bulk concentration onto the thin double layer required to support an applied voltage. The concentration of these ions is increased by several orders of magnitude due to the migration of the ions from the solution onto the double layer. The automated features of this analysis system and the unique operation of the pre-concentration device allow for in-situ operation remote operation and eliminate the need for highly trained operators.

Figures

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